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ABSTRACT

Computer files containing enrollment data for an urban, multi-campus community college for Fall 1972 and Fall 1978 were examined as part of a longitudinal study to determine: (1) enrollment trends of male and female students: (2) enrollment trends of male and female students for selected curriculum areas (Arts, Business Technology, Engineering/Industrial Technology, Public Service Technology, and Science): (3) trends in female enrollments in non-traditional curricular areas: and (4) whether male/female enrollment shifts were caused by increasing numbers of new female students or by returning female students. Major findings indicated that while college-wide male enrollments rose 204% from 1972 to 1978, female enrollments rose 492% in the same period. The enrollment rate of females classified as returning students increased even more (688%), and the proportion of returning students who were females rose from 25% in 1972 to 45% in 1978. Curriculum data showed that only Business Technology did not have a significant change in female enrollments, and that the proportion of females in non-traditional curriculum areas remained constant. The proportion of full- and part-time female students to their respective male counterparts increased significantly from 1972 to 1978, except for Business Technology students, and part-time Engineering/Industrial female students. Data tables are provided throughout the document. (JP)

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IMPACT OF FEMALE ENROLLMENT ON AN URBAN INSTITUTION

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Introduction

Throughout the nation, women have been enrolling in institutions of higher education at an increasing rate. Enrollment data for higher education indicate that females now comprise a majority of undergraduate students. Particularly at community colleges, the increase in the enrollment of female students in recent years has been so great that the student mix at many institutions has been reversed. By attempting to serve local educational needs, community colleges have been far more successful than four-year colleges/universities in attracting new female students, many from the non-traditional categories (over 25 years of age and non-Caucasian). For community colleges, recent enrollment data reveal a significant increase in the number of part-time females (Walsh, 1979). The open admissions policy of many community colleges has assisted immensely in the recruitment of these first-time female students (Cross, 1976).

Based on numerous independent factors, the student enrollment at most community colleges will continue to be varied, attracting large numbers of presently non-traditional students (Myran, 1978). In order to remain educationally effective and responsive, community colleges will need to be aware of shifting enrollment patterns among their students. Community colleges, because of their direct relationship to satisfying local educational needs, must be knowledgeable of the changing academic interests of their students. With the increasing surge of female students, institutions will need to periodically evaluate their student composition. In addition, enrollments in current academic programs will need to be evaluated in order to determine changing demands of new students. For urban institutions, awareness of such enrollment information would be

essential, especially for academic planning and budgeting.

The purpose of this paper is to report the major findings of a longitudinal study on the impact of increasing female student enrollments at an urban, multi-campus community college. In light of substantial increases in the enrollment of female students, the following research questions were examined: 1) was there a significant difference between the enrollment trends of female and male students; 2) were there any significant differences between the enrollment trends of female and male students for selected curriculum areas; 3) for individual curricula, were female student enrollments significantly different from male student enrollments; 4) were female student enrollments significantly increased in any of the non-traditional curricula; and 5) were the enrollment shifts between female students and male students the result of significant increases of new female students or returning female students?

Methodology

The sample data incorporated in this study were obtained from historical computer files which contained enrollment information for fall 1972 and fall 1978. To evaluate enrollment patterns, headcount data for the College, curriculum areas and individual curricula was distributed by first-time students/returning students status, which in turn was partitioned by male/female status. Five curriculum areas, Arts, Business Technology, Engineering/Industrial Technology, Public Service Technology and Science, were included in the analyses. The remaining curriculum areas were excluded because of their low enrollments.

In order to analyze longitudinal data, two-way contingency tables were

constructed for each of the enrollment variables selected. For each table, the data were grouped by sex across the years examined. Contingency table analysis was performed to determine significant changes in the proportion of enrolled students by female/male status. Because of the varied sample sizes, an overall G-statistic was computed for each contingency table.[1] The basic reasonings for implementing the G-statistic in the analyses of this study were: 1) general theoretical advantages; 2) computationally simpler for testing of independence for higher order contingency tables; and 3) the advantage of additivity, which allows an overall G-test to be partitioned into meaningful, separate G-tests representing individual degrees of freedom, analogous in a manner to analysis of variance. Evaluation of the derived G-statistics assisted in the determination of changes in the enrollment patterns of female students.

Results

College-wide, the distribution of curriculum enrollment data by female/male status changed significantly between fall 1972 and fall 1978. Specifically, examination of the data indicated that males, while comprising 69 percent in 1972, accounted for only 53 percent of the curriculum enrollment in 1978. While increasing numerically (+204 percent), the proportion of male students within the total enrollment followed

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[1] A general computer program was developed to produce a G-statistic for analysis of two-way contingency tables. This program was structured with the unique aspect of accepting data input in the form of cell totals from previously derived contingency tables, allowing for analyses when individual response data are not available. A copy of the computer program is available from the authors upon request.

a negative trend across the time period examined. In contrast, female enrollment rose 492 percent during the same period, increasing numerically from 699 to 4139. The number of first-time females enrolled each fall increased from 362 in 1972 to 1482 for 1978, representing a 309 percent increase. Even more significant, females classified as returning students increased 688 percent between 1972-1978. The continued growth in the number of returning female students was a major factor for the change in the proportional distribution of curriculum enrollment. The proportion of returning students who were female increased from 25 percent in 1972 to 45 percent for 1978. In contrast, the distribution of curriculum enrollment by new/return status remained fairly constant during the period examined.

Examination of the data in Table 1 indicated that three of the curriculum areas had a significant change in the enrollment pattern. Specifically, Arts, Public Service Technology and Sciences had major changes in the proportion of male and female students enrolled between 1972 and 1978. All three curriculum areas had significant increases in the proportion of enrolled female students. Arts was the only curriculum area where the number of female students enrolled increased while the number of male students decreased. While significant at the .05 level, the Engineering/Industrial Technology area also had a major change in the enrollment of female students. Though somewhat low, the number of female students in Engineering/Industrial Technology did increase annually and accounted for 7 percent of the curricular enrollment in 1978. The only curriculum area that did not have a significant change in the enrollment of female students was Business Technology. While both groups increased

TABLE 1

1972 - 1978 ENROLLMENT DATA

(MALE VERSUS FEMALE)

CURRICULUM	1972	1978	G-STATISTIC	SIGNIFICANCE LEVEL
Arts				
Female	312	549		
Male	469	292	105	<.0001
Business				
Female	222	2148		
Male	8138	1556	2	NS
Engineer/Industrial				
Female	5	64		
Male	144	808	4	.05
Public Service				
Female	30	461		
Male	183	554	81	<.0001
Sciences				
Female	84	715		
Male	589	1381	131	< .0001
College				
Female	699	4139		
Male	1534	4661	184	< .0001

(NS = Not significant)
(G-statistic values rounded to nearest whole number)

numerically each year, the proportion of male and female students in Business Technology remained fairly constant between 1972 and 1978.

Providing partial explanation of the overall trend, only Arts and Sciences had a significant change in the enrollment of first-time females versus first-time males (Table 2). For Arts, the number of first-time females increased slightly between 1972 and 1978 while the number of first-time males decreased drastically. In contrast, the number of first-time females and first-time males in Sciences increased, with new females increasing at a significantly higher rate, such that they accounted for 38 percent of all first-time students in 1978. The three remaining curriculum areas, Business Technology, Engineering/Industrial Technology and Public Service Technology, had minor changes in the proportion of first-time students by male/female status. Overall, College data indicated a significant increase in the enrollment of first-time female students enrolled in curriculum areas.

Identical to the results in Table 1, the analysis of returning students by male/female status indicated significant changes in the enrollment pattern of all curriculum areas except Business Technology (Table 3). Arts, Public Service Technology and Sciences had highly significant changes in the proportion of returning female students between fall 1972 and fall 1978. The dramatic increase in the number of returning female students in these three curriculum areas contributed considerably to the overall significant change in their respective total enrollment. Though numerically low, returning females in Engineering/Industrial Technology increased slightly, accounting for 7 percent of all returning students in 1978. Evaluation of the returning student enrollment data for Business Technology indicated

TABLE 2

1972 - 1978 ENROLLMENT DATA

(NEW MALES VERSUS NEW FEMALES)

CURRICULUM	1972	1978	G-STATISTIC	SIGNIFICANCE LEVEL
Arts				
Female	168	174		
Male	170	74	21	< .0001
Business				
Female	105	860		
Male	33	379	3	NS
Engineer/Industrial				
Female	4	28		
Male	65	297	1	NS
Public Service				
Female	19	132		
Male	28	127	2	NS
Sciences				
Female	55	273		
Male	200	479	20	< .0001
College				
Female	362	1482		
Male	496	1374	25	< .0001

(NS = Not significant)
(G-statistic values rounded to nearest whole number)

TABLE 3

1972 - 1978 ENROLLMENT DATA

(RETURN MALE VERSUS RETURN FEMALE)

CURRICULUM	1972	1978	G-STATISTIC	SIGNIFICANCE LEVEL
Arts				
Female	144	385		
Male	299	218	102	<.0001
Business				
Female	117	1288		
Male	105	1177	0	NS
Engineer/Industrial				
Female	1	36		
Male	79	511	5	.05
Public Service				
Female	11	329		
Male	155	427	98	<.0001
Sciences				
Female	29	442		
Male	389	902	133	<.0001
College				
Female	337	2657		
Male	1038	3287	198	<.0001

NS = Not significant

G-statistic values rounded to nearest whole number

little change between 1972 and 1978. Overall, the influx of the large number of returning female students was a significant factor in the changing enrollment pattern at the College.

College-wide, the proportion of females classified as returning students increased significantly from 48 percent in 1972 to 64 percent in 1978. As identified in the other student classifications, returning female students contributed significantly to the overall change in the College enrollment pattern. From the analyses of the data in Table 4, Arts, Public Services and Sciences suffered significant proportional decreases for first-time female students, which was accountable to large numerical increases in returning female students. Engineering/Industrial Technology and Business Technology had minor changes in the proportional distribution of female students by first-time/returning status. Interestingly, Business Technology was the only curriculum area where the changes in the enrollment pattern of first-time/returning females was significant while the changes in distribution of total enrollment by female/male status was not.

Presented in Tables 5-8, evaluation of data representative of female and male student enrollment by full-time and part-time academic status substantiated the major findings aforementioned for female enrollment at the College and in the curriculum areas. Since the proportion of female students remained consistent between 1972 and 1978, the data for Business Technology was excluded from the full-time/part-time analysis. For the four remaining curriculum areas and the College, the proportion of full-time and part-time female students to their respective male counterparts increased significantly from 1972 to 1978, except for part-time Engineering/ Industrial female students. Between first-time males and first-time

TABLE 4

1972 - 1978 ENROLLMENT DATA

(NEW FEMALES VERSUS RETURN FEMALES)

CURRICULUM	1972	1978	G-STATISTIC	SIGNIFICANCE LEVEL
Arts				
New	168	168		
Return	144	385	48	<.0001
Business				
New	105	860		
Return	117	1288	4	.05
Engineer/Industrial				
New	4	28		
Return	1	36	3	.10
Public Service				
New	19	132		
Return	11	329	14	<.0001
Sciences				
New	55	273		
Return	29	442	23	<.0001
College				
New	362	1482		
Return	337	2657	63	<.0001

NS = Not significant

G-statistic values rounded to nearest whole number

TABLE 5

1972 - 1978 ENROLLMENT DATA

(MALE VERSUS FEMALE)

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Arts		
Full-Time	54	< .0001
Part-Time	24	< .0001
Engineer/Industrial		
Full-Time	10	< .0001
Part-Time	0	NS
Public Service		
Full-Time	49	< .0001
Part-Time	39	< .0001
Sciences		
Full-Time	70	< .0001
Part-Time	27	< .0001
College		
Full-Time	120	< .0001
Part-Time	65	< .0001

NS = NOT SIGNIFICANT
G- statistic values rounded to nearest whole number

TABLE 6

1972 - 1978 ENROLLMENT DATA

(NEW MALES VERSUS NEW FEMALES)

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Arts		
Full-Time	20	< .0001
Part-Time	0	NS
Engineer/Industrial		
Full-Time	3	.10
Part-Time	1	NS
Public Service		
Full-Time	7	< .0001
Part-Time	0	NS
Sciences		
Full-Time	10	< .0001
Part-Time	0	NS
College		
Full-Time	23	< .0001
Part-Time	0	NS

NS = Not signficant
G-statistic values rounded to nearest whole number

TABLE 7

1972 - 1978 ENROLLMENT DATA

(RETURN MALES VERSUS RETURN FEMALES)

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Arts		
Full-Time	41	< .0001
Part-Time	34	< .0001
Engineer/Industrial		
Full-Time	3	.10
Part-Time	0	NS
Public Service		
Full-Time	50	< .0001
Part-Time	48	< .0001
Sciences		
Full-Time	75	< .0001
Part-Time	33	< .0001
College		
Full-Time	114	< .0001
Part-Time	87	< .0001

NS = Not significant
G-statistic values rounded to nearest whole number

TABLE 8

1972 - 1978 ENROLLMENT DATA

(NEW FEMALES VERSUS RETURN FEMALES)

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Arts		
Full-Time	10	< .0001
Part-Time	13	< .0001
Engineer/Industrial		
Full-Time	0	NS
Part-Time	2	NS
Public Service		
Full-Time	10	< .0001
Part-Time	4	.05
Sciences		
Full-Time	13	< .0001
Part-Time	3	.10
College		
Full-Time	24	< .0001
Part-Time	8	< .0001

(NS = Not significant)
(G-statistic values rounded to nearest whole number)

females, full-time enrollment increased as a result of larger numbers of first-time, full-time females while part-time enrollment maintained a consistent proportional distribution by male/female status. For both full-time and part-time enrollment, returning female students increased at a significantly higher rate than returning males, except for Engineering/ Industrial Technology. Within female student enrollment, major increases in the number of returning females were accountable for significant enrollment changes in all curriculum areas except Engineering/Industrial Technology.

Presented in Tables 9-12, individual curriculum data were analyzed to assess whether significant changes in enrollment by female/male status had occurred. For Engineering/Industrial Technology, only Drafting/Design and Air Conditioning/Refrigeration had major changes in the proportion of female students. Data for Drafting/Design revealed increases for both males and females, with females sustaining a slightly higher enrollment rate. Air Conditioning/Refrigeration maintained a constant female enrollment while male students increased significantly. All three curricula examined in Arts, (Education, Liberal Arts and Music), had a significant change in the proportion of enrolled female students. Both Liberal Arts and Education curricula had major decreases in the number of male students while the number of female students increased. In contrast, male enrollment in Music remained constant while female enrollment increased. Business Administration and Science within the Sciences currriculum area were found to have significant changes in enrollment trends. Both of these curricula in Sciences had increasing enrollments of female and male students, with female students comprising a larger percentage of the total enrollment in 1978 than in 1972. For Public Services Technology, only Police Science

TABLE 9

ENGINEERING/INDUSTRIAL TECHNOLOGY

COMPARISON OF 1972 - 1978 ENROLLMENT DATA

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Air Conditioning/Refrigeration	5	.05
Auto Analysis/Repair	0	NS
Drafting	0	NS
Drafting/Design	9	<.0001
Electrical/Electronics	1	NS
Electrical/Electronics Engineering	1	NS
Radio/TV Repair	0	NS
Vending Machine Repair	0	NS
Welding	2	NS

NS = Not significant
G - statistic values rounded to nearest whole number

TABLE 10

ARTS

COMPARISON OF 1972 - 1978 ENROLLMENT DATA

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Education	50	< .0001
Liberal Arts	36	< .0001
Music	7	< .0001

TABLE 11

SCIENCES

COMPARISON OF 1972 - 1978 ENROLLMENT DATA

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Business Administration	88	<.0001
Engineering	0	NS
General Studies	1	NS
Science	54	<.0001

NS = Not significant G-statistic values rounded to nearest whole number

TABLE 12

PUBLIC SERVICES

COMPARISON OF 1972 - 1978 ENROLLMENT DATA

CURRICULUM	G-STATISTIC	SIGNIFICANCE LEVEL
Community/Social Services	2	NS
Corrections	0	NS
Early Childhood Instruction	0	NS
Fire Science	0	NS
Law Enforcement	2	NS
Police Science	4	.05
Recreational Leadership	0	NS

NS = Not significant
G-statistic values rounded to nearest whole number

had a significantly positive increase in the proportion of female students.

For the non-traditional areas examined, the proportion of female enrollment remained relatively consistent between 1972 and 1978 in the following curricula: Auto Analysis/Repair, Drafting, Electrical/Electronics, Electrical/Electronic Engineering, Vending Machine Repair, Welding, Engineering, Corrections, Fire Science, Law Enforcement and Recreational Leadership. However, female students had made significant enrollment increases in the non-traditional curricula of Police Science and Drafting/Design. Overall, female enrollment remained somewhat proportionally constant in the majority of the non-traditional curricula examined in this study.

Implications

From the analyses of longitudinal data in this study, shifts in the enrollment patterns of female students at an urban, multi-campus institution were evaluated. For the subject institution, the results of the study achieved the following:

1) identified changes in the enrollment patterns among the various curriculum areas and individual curricula;

2) provided necessary information for academic planning and evaluation;

3) identified those curriculum areas and curricula that are attracting and/or retaining significant numbers of female students; and

4) determined the current curricula interests of female students which would influence the operations of various administrative areas, such as counseling, admissions and financial aid.

As women continue to become major consumers of higher education, institutions will need to be aware of the changing curricular interests of their female students. Greater numbers of women are enrolling in both the traditional

and non-traditional curriculum areas.

The influx of women, especially in the non-traditional areas, may necessitate the need for curriculum revisions so as to be more aligned with the new demands and desires of the female students. Institutional planning and budgeting may be affected, as resources are shifted to those curriculum areas where enrollments are increasing (Mills, 1978). As recruitment competition increases, evaluation of longitudinal enrollment data is just one segment of an overall institutional assessment that can assist in evaluating and maintaining effective academic programming. In order to survive, institutions of higher education will have to be more sensitive to the interests of their clientele, particularly now that women are a definite component of the student population.

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